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Sign-Speaks From Audi-Scan

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Abstract

This research introduces a new system that helps people who use sign language communicate with those who don't. The system uses advanced technology to watch and understand hand movements, recognizing sign language gestures in real time. It then translates these gestures into text and, using speech technology, turns the text into spoken words. This makes communication easier by providing both written and spoken translations of sign language. The system could greatly improve how people with hearing impairments interact in social, educational, and work environments, making things more inclusive and accessible for everyone.

INTRODUCTION

The ability to communicate effectively is fundamental to human interaction and plays a crucial role in educational, social, and professional settings. For individuals with hearing impairments, however, traditional communication methods can pose significant challenges. The development of innovative technologies that bridge the communication gap between the hearing and deaf communities is therefore essential to promote inclusivity and equal opportunities.

This research paper presents a novel application designed to facilitate seamless communication between individuals who use sign language and those who rely on spoken language. By leveraging the power of computer vision and natural language processing, the application aims to provide a reliable and efficient means of translating sign language into text and audio formats. This innovative approach has the potential to revolutionize communication for the deaf community, enabling individuals to participate more fully in educational, social, and professional activities.

LITERATURE REVIEW

Pradeep Sudhakaran and Preetha M. [1] In their work "Converting Audio to Indian Sign Language in Visual format". Purpose the system to address the gap between deaf and the general community. It converts speech into text by using the voice-to-text application programming

interface it represents the text by using Parse Trees and employs NLTK for the purpose of lexical analysis of Indian Sign Language. And in the future work will be on Real-time translation and improved gesture recognition.

V Harit and N Sharma. [2] Presented **"**Speech to sign Language Translator using NLP" to convert text and speech input in English into expressive actions and gestures of the standard Indian sign language, in the form of an animated avatar on the webpage. With the technique The audio to sign language translator utilizes natural language processing techniques implemented in Python, using machine learning algorithms for model training. In future the work will be on Integration with various languages and dialects.

N-Fatima And M Sridevi. [3] in their paper "Linking Audio, Text and Hand Gestures Using Machine Learning Algorithm" work on system aims to overcome the problem in deaf and general communities by audio and text communication with American Sign Language (ASL) through advanced hand gesture recognition technology and the technique used for solve this problem are ASL Animations; CNN; Gesture recognition; Multilingual conversion; Speech recognition and wants to work on Expansion to more sign language dialets in future.

Zeyer-etal. [4] and the team Introduces "End to-End Speech Recognition with Transformer" in this they Improving accuracy and efficiency of speech recognition with the help of techniques Transformer models, Self Attention Mechanism**.** In future may be work done on Integration with various languages and dialects.

Vaddhi raju Swathi. [5] and members present the System title "Audio To Sign Language Converter Using Python for The existing system focuses on taking the text and audio as input and the techniques in this are The audio from the user is converted to text using NLTK(Natural language Toolkit). Natural Language Processing, Machine Learning, Lemmatization**,** Stop words, Tokenization Characterization, Speech API, NLP toolkit, localhost, Hand Gestures, Sign Language. In future might be work on To develop a system that can actually listen to the user and take the audio as the input, that is in turn converted it into the sign language (Indian sign language).

Kiran Kumar Bonthu. And members [6] represent "A Survey Paper on Emerging Techniques Used to Translate Audio or Text to Sign Language" for The purpose of this system is to overcome the problem that exists between deaf people and normal people with the help techniques An application is used for translating Speech/Text to Indian Sign Language has been created by using NLP concepts. To Build the model ,python libraries like Speech Recognition and Py-audio have been used in future they want to work on The model can be transformed into a mobile application using Kivy and KivyMD frameworks. The application response to most of the audio correctly by producing the assigned images.

Karthik M R. and teams [7] publish the "Text Interpreter and Converter" to solve the problem an android application to recognize, summarize, translate, and convert text to speech and then convert it into sign language. And the techniques used to solve problem are Optical Character Recognition, Summarization, Translate, text to-sign. In the future, they can add different languages, where we can extract characters from local languages and translate, summarize and generate speech for that particular language.

Lee et al with members. [8] presented "Automated Sign Language Interpretation with AR" for providing real-time sign language explanation in augmented reality with the technologies Augmented Reality, Machie Learning. In future they can Enhanced AR interactions and multilanguage support.

Kim etal and team [9] presented "Deep Learning Approach for Real Time Speech to Text Conversion" for the system Real-time conversion is possible with high accuracy. With technologies are Design uses the Deep Learning algorithm, Sequence to-Sequence Model. In future this system can be used to optimization for mobile and embedded systems.

Fernandz et al and group [10]. Work on "Sign Language Recognition Using Multi-modal Approaches" for Improving sign language recognition accuracy. Technologies used for that are Multimodal Learning, Fusion of Audio and Visual Data. In future the work will be for Integration with interactive sign language teaching tools**.**

Archana P, Imran Sunil, Jesn a Joy, Nand hu Gopan, Tin Mol Andrews. [11] introduces "Machine Learning Based Ai Generated Web Application For Sign Language Translation" for Improving sign language recognition accuracy. With technologies CNN-based method to convert video to text

conversion and develop a model to suit the purpose. Webcam feed of the sign language can be converted to text by predicting the alphabet with the help of the model, from a region of interest, and finally displaying it to the user. The processing is done through an LSTM algorithms.Future improvements will enhance the application's capabilities and make it an even more impactful tool for facilitating communication between the deaf and hearing communities.
Purushottam Sharma Devesh Tulsian Chaman Verma Pratibha Sharma and Nancy. [12] work for system "Translating Speech to Indian Sign Language Using Natural Language Processing". For the system accepts audio and text as input and Matches it with the videos present in the database created by the authors with technologies NLTK is the heart of the audio to Indian Sign Language conversion system, as it is the most powerful open-source NLP library which is used to assist with human language data.The features of the system can be improved by integrating reverse functionality, i.e. an Indian Sign Language to audio/text translation system which could open the path for a two-way communication system.

Limitation Of Existing System

- **Accuracy Problems:** The system might not always understand all sign language gestures correctly, especially if they are fast or complex. It can make mistakes in recognizing signs.
- **Limited Vocabulary**: SignSpeaks might not know all the signs in different sign languages. It can only understand a certain number of signs, so if someone uses a sign it doesn't know, the system won't understand it.
- **Background Interference:** If there's a lot of movement or distractions in the background, it can confuse the system. The camera might pick up other things that aren't sign language, causing errors.
- **Lighting Issues:** The system needs good lighting to work well. If the lighting is too dark or too bright, it might not be able to clearly capture the person's hands or movements.
- **Different Signing Styles:** People sign differently, depending on their speed, style, or regional dialect. The system might struggle to understand different variations in signing.
- **Requires Good Camera Setup:** The system relies on cameras to see the signs, so if the camera isn't positioned properly or if it's of low quality, the system won't work well.

Proposed system

In this project we will add 3 options Audio, Text and Scanning so that user can select any one according to their desire. Multiple Sign Languages. We can include various sign languages like Indian sign language. Enhanced text processing using advanced NLP techniques. The system providing 2D animation videos for better understanding**.**

PROBLEM STATEMENT

To solve the problem of Communication barriers between hearing-impaired individuals and the general public are a significant challenge, particularly in public spaces like railway stations. Traditional announcements made over loudspeakers are inaccessible to those who rely on sign language, leaving them disconnected from important information. Additionally, there is limited support for converting written English text into regional languages like Hindi or Marathi along with corresponding sign language for better accessibility. Moreover, learning resources for sign language are often fragmented, making it difficult for interested individuals to gain proficiency.

OBJECTIVE

- **Real-Time Speech-to-Sign Language Conversion:** Implement a system that converts live or recorded audio announcements into 2D animated sign language in real-time.
- **Text Recognition and Translation:** Create a feature that allows users to scan English text using a mobile camera, translate it into Hindi or Marathi, and then convert the translated text into animated sign language.
- **Educational Resources for Sign Language Learning:** Provide a curated selection of YouTube videos and playlists related to sign language education.

- **User Authentication and Management**: Implement a secure and user-friendly authentication system for login, registration, and password recovery.
- **User Interface and Experience:** Design and develop an intuitive and accessible user interface that facilitates easy navigation and interaction with the platform**.**

HARDWARE AND SOFTWARE REQUIREMENT

Hardware Requirements :

- Memory : 8GB RAM
- Processor : Intel i5/i7 or AMD Ryzen 5/7
- Storage : 256GB or more
- OS : Windows, macOS or Linux

Software Requirements :

- Python 3.7+
- Speech Recognition
- Pygames or 3D engines
- NLP

ALGORITHM

1. CNN Algorithm:

- **Input Layer:** Accepts preprocesses images (224×224×1 for grayscale).
- **Convolutional Layers:** Extract key features using filters (e.g., 3×3 kernels).
- **Pooling Layers:** Reduce dimensionality using Max Pooling (2×2). Fully Connected Layers: Flatten output and connect to dense layers for classification.
- **Output Layer:** Uses SoftMax or Sigmoid activation to classify image into sign language.

2.RNN Algorithm:

- **Processing (Text/Speech to Sequence):**
  If input is text → Convert sentences into a sequence of words.
  If input is speech → Use Speech-to-Text models to transcribe the speech into text.
- **Text Sequence Encoding Using RNN:**
  Tokenize words (e.g., "Hello, how are you?" → ["Hello", "how", "are", "you"]) The model learns the relationship between words and corresponding ISL gestures.
- **Mapping Text to ISL Gestures:**
  Each recognized word or phrase is mapped to a predefined ISL sign/video/image dataset.
- **Sign Language Gesture Output:**
  The system can display pre-recorded videos, animated avatars, or robotic hand movements to represent the ISL gestures.

2. Google APIs:

- **Speech-to-Text API:** Converts spoken announcements or audio input into text, which is then used for sign language conversion.
- **Optical Character Recognition:** Recognizes and extracts text from images captured by the user's mobile camera, allowing for text-to-sign language conversion.
- **Translation API:** Translates English text into Hindi or Marathi, enabling multilingual text conversion to assist in the sign language translation process.
- **YouTube Data API:** Integrates YouTube videos and playlists into the platform, allowing users to access educational resources related to learning sign language

APPLICATIONS

The Sign-Speaks From Audi-Scan System has several practical applications across different sectors:

- **Public Transportation:** Use in railway stations, bus terminals, and airports to provide real-time sign language translations of announcements, ensuring hearing impaired passengers receive timely information.
- **Educational Institutions:** Support in schools and universities for students with hearing impairments by translating educational content and announcements into sign language. Healthcare Facilities: Improve communication in hospitals and clinics by providing sign language translations for medical announcements, instructions, and patient interactions.
- **Community Centers:** Assist community centers and public service organizations in delivering accessible information and resources to hearing-impaired individuals.
- **Online Learning Platforms:** Integrate into e-learning environments to offer sign language translations of educational content and materials for remote learners**.**
- **Customer Service:** Enhance accessibility in customer service settings, such as retail and support centers, by providing sign language translation for customer interactions and support.
- **Public Awareness Campaigns:** Use in awareness campaigns and events to communicate important messages and information to the hearing-impaired community in an accessible format.
- **Sign Language Education:** Provide resources for learning sign language, including tutorials, videos, and interactive content to support learners and educators.

RESULTS

This is Login Page is provided to user with create Account option.

In next page the Forget Password option is Provided.

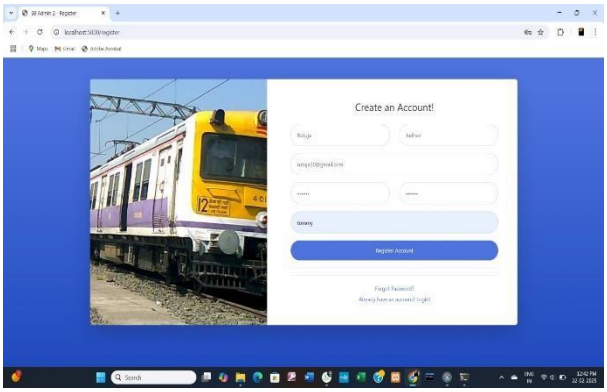

Fig.1 Login page

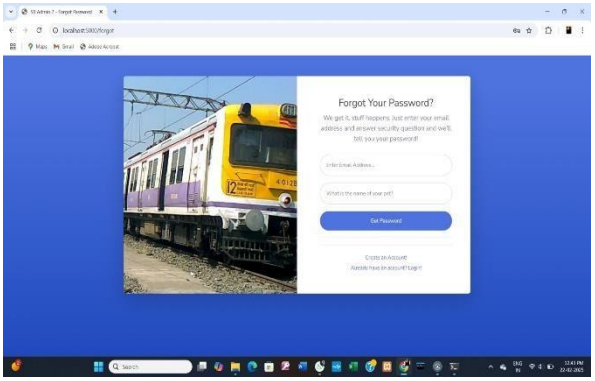

Fig2. Forgot Password

In Home Page various options are provided.

In project overview the project information is Available.

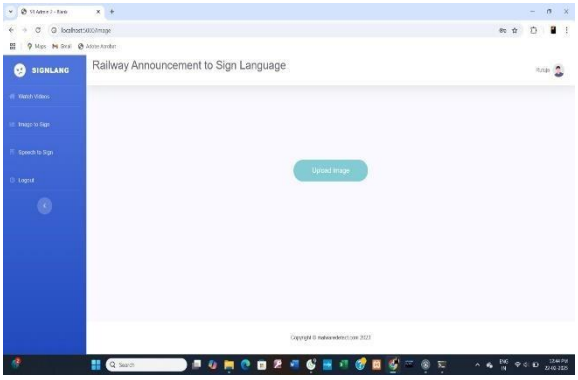

Fig 3. Home page

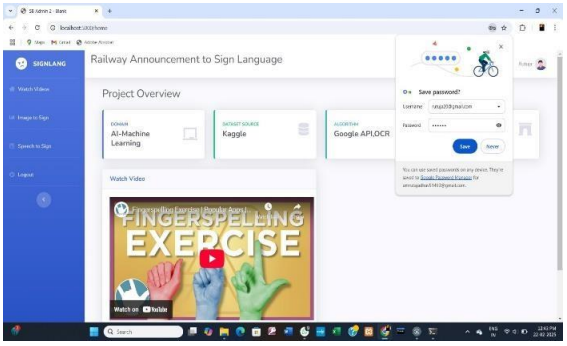

Fig 4. Project Overview

This shows the output for the Image input. and then it

In this page user can record audio for input Gives the output according to the input.

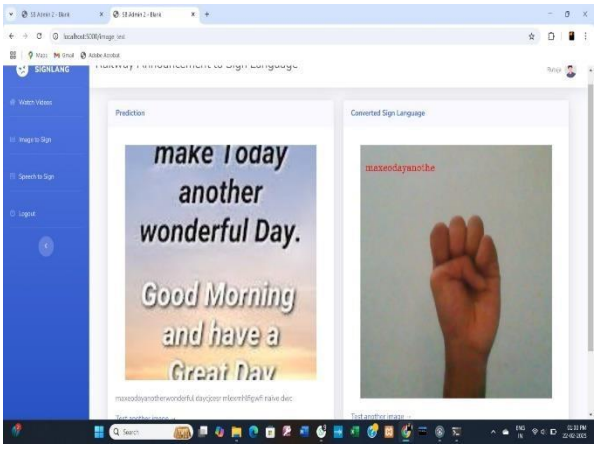

Fig 5. Image to Sign language

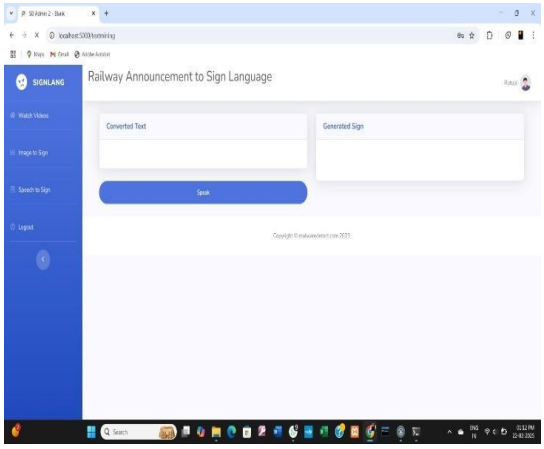

Fig 6. Speech to Sign language

CONCLUSION

The Sign Language Communication and Education Platform is an innovative tool designed to bridge the communication gap between hearing-impaired individuals and the general public. By offering real-time speech-to-sign language conversion, text recognition, translation, and educational resources, this platform enhances accessibility and promotes sign language education. It provides a user-friendly interface and integrates modern technologies like speech recognition, translation APIs, and animated sign language generation, making it a comprehensive solution for communication challenges faced by the hearingimpaired community. The platform successfully.

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